Amendments to the Claims

This listing of claims replaces all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently amended) A portable information apparatus having an electroluminescence display device, said electroluminescence display device comprising:

~~a plurality of pixels, each of said plurality of pixels having a plurality of memory circuits and a D/A converter.~~

at least first and second gate signal lines;

a source signal line; and

at least one pixel comprising:

at least first and second memories electrically connected to the source signal line; and

a D/A converter for converting digital signals stored in the at least first and second memories into an analog signal,

wherein operations of the at least first and second memories controlled by the at least first and second gate signal lines.

2. (Currently amended) A portable information apparatus having an electroluminescence display device, said electroluminescence display device comprising:

~~a plurality of pixels, each of said plurality of pixels having n memory circuits and a D/A converter for converting digital signals stored in said n memory circuits into an analog signal.~~

a gate signal line;

at least first and second source signal lines; and

at least one pixel comprising:

at least first and second memories; and

a D/A converter for converting digital signals stored in the at least first and second memories into an analog signal,

wherein the at least first and second memories electrically connected to the at least first and second source signal lines.

3. (Previously Presented) A portable information apparatus having an electroluminescence display device, said electroluminescence display device comprising:

a plurality of power supply lines;

a plurality of pixels, each of said plurality of pixels having n memory circuits and a D/A converter for converting digital signals stored in said n memory circuits into an analog signal;

a thin film transistor having a gate electrode, a source region and a drain region, with said gate electrode being connected to receive an analog signal from the D/A converter of one said pixels, and one of said source region and said drain region being connected to one of said plurality of power supply lines; and

an electroluminescence element connected to one of said source region and said drain region that is not connected to one of said plurality of power supply lines.

4. (Previously Presented) A portable information apparatus having an electroluminescence display device, said electroluminescence display device comprising:

a plurality of power supply lines;

a plurality of pixels, each of said plurality of pixels having n X m memory circuits and a D/A converter for converting digital signals stored in said n X m memory circuits into an analog signal;

a thin film transistor having a gate electrode, a source region and a drain region, with said gate electrode being connected to receive an analog signal from the D/A converter of one of said pixels, and one of said source region and said drain region being connected to one of said plurality of power supply lines; and

an electroluminescence element connected to one of said source region and said drain region that is not connected to one of said plurality of power supply lines.

5. (Previously Presented) The portable information apparatus of claim 4, wherein each of the plurality of pixels stores digital signals for m frames.

6. (Previously Presented) A portable information apparatus according to claim 1, wherein:

the electroluminescence display device includes a source signal line, and

the memory circuits and the D/A converter are disposed to overlap with the source signal line.

7. (Previously Presented) A portable information apparatus according to claim 1, wherein:

the electroluminescence display device includes a gate signal line, and

the memory circuits and the D/A converter are disposed to overlap with the gate signal line.

8. (Previously Presented) A portable information apparatus having an electroluminescence display device, said electroluminescence display device comprising a plurality of pixels, each of said plurality of pixels having:

n gate signal lines;

a plurality of source signal lines crossing said n gate signal lines;

a plurality of power supply lines disposed parallel to said n gate signal lines or said plurality of source signal lines;

n first thin film transistors, each of said n first thin film transistors having a first gate electrode, a first source region and a first drain region, with said first gate electrode being

connected to one of said n gate signal lines, and one of said first source region and said first drain region being connected to one of said plurality of source signal lines;

n memory circuits, with an input terminal of each of said n memory circuits being connected to said one of said first source region and said first drain region;

a D/A converter connected to an output terminal of each of said memory circuit;

a second thin film transistor having a second gate electrode, a second source region and a second drain region, with said second gate electrode being connected to an output terminal of said D/A converter and one of said second source region and said second drain region being connected to one of said plurality of power supply lines; and

an electroluminescence element connected to one of said second source region and said second drain region.

9. (Previously Presented) A portable information apparatus having an electroluminescence display device, said electroluminescence display device comprising a plurality of pixels, each of said plurality of pixels having:

n source signal lines;

a plurality of gate signal lines crossing said n source signal lines;

a plurality of power supply lines disposed parallel to said n source signal lines or said plurality of gate signal lines;

n first thin film transistors, each of said n first thin film transistors having a first gate electrode, a first source region and a first drain region, with said first gate electrode being connected to one of said n source signal lines, and one of said first source region and said first drain region being connected to one of said plurality of gate signal lines;

n memory circuits, with an input terminal of each of said n memory circuits being connected to said one of said first source region and said first drain region;

a D/A converter connected to an output terminal of each of said memory circuit;

a second thin film transistor having a second gate electrode, a second source region and a second drain region, said second gate electrode being connected to an output terminal of said

D/A converter and one of said second source region and said second drain region being connected to one of said plurality of power supply lines; and

an electroluminescence element connected to one of said second source region and said second drain region.

10. (Original) A portable information apparatus according to claim 8, wherein the electroluminescence display device includes a source signal line driving circuit, and

the source signal line driving circuit includes shift registers, first latch circuits for holding n-bit digital signals by sampling pulses from the shift registers, second latch circuits to which the n-bit digital signals held in the first latch circuits are transferred, and switches for sequentially selecting one bit by one bit the n-bit digital signals transferred to the second latch circuits to input them to the source signal line.

11. (Original) A portable information apparatus according to claim 8, wherein the electroluminescence display device includes a source signal line driving circuit, and

the source signal line driving circuit includes shift registers, first latch circuits for holding one-bit digital signals by sampling pulses from the shift registers, and second latch circuits to which the one-bit digital signals held in the first latch circuits are transferred.

12. (Original) A portable information apparatus according to claim 9, wherein the electroluminescence display device includes a source signal line driving circuit, and

the source signal line driving circuit includes shift registers, and latch circuits for holding n-bit digital signals by sampling pulses from the shift registers.

13. (Original) A portable information apparatus according to claim 9, wherein the electroluminescence display device includes a source signal line driving circuit, and

the source signal line driving circuit includes shift registers, latch circuits for holding n-bit digital signals by sampling pulses from the shift registers, and n switches for inputting the n-bit digital signals held in the latch circuits to the n source signal lines.

14. (Previously Presented) A portable information apparatus according to claim 1, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

15. (Previously Presented) A portable information apparatus according to claim 1, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

16. (Previously Presented) A portable information apparatus according to claim 1, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

17-19. (Canceled)

20. (Previously Presented) A method of driving a portable information apparatus including an electroluminescence display device and a CPU, wherein

the electroluminescence display device includes a plurality of pixels and a first circuit for outputting signals to the plurality of pixels, and

the CPU includes a second circuit for controlling the first circuit,

the method comprising:

storing digital signals in a plurality of memory circuits included in each of the plurality of pixels,

repeatedly reading the stored digital signals,

converting the repeatedly read digital signals into corresponding analog signals,

inputting the analog signals to an electroluminescence element, and

stopping an operation of the second circuit.

21. (Previously Presented) A method of driving a portable information apparatus incorporating an electroluminescence display device including a plurality of pixels, and a VRAM,

the method comprising:

storing digital signals in a plurality of memory circuits included in each of the plurality of pixels,

repeatedly reading the stored digital signals,

converting the repeatedly read digital signals into corresponding analog signals,

inputting the analog signals to an electroluminescence element, and

stopping a data readout operation of the VRAM.

22-25. (Canceled)

26. (Previously Presented) A portable information apparatus according to claim 2, wherein:

the electroluminescence display device includes a source signal line, and

the memory circuits and the D/A converter are disposed to overlap with the source signal line.

27. (Previously Presented) A portable information apparatus according to claim 3, wherein:

the electroluminescence display device includes a source signal line, and

the memory circuits and the D/A converter are disposed to overlap with the source signal line.

28. (Previously Presented) A portable information apparatus according to claim 4, wherein:

the electroluminescence display device includes a source signal line, and

the memory circuits and the D/A converter are disposed to overlap with the source signal line.

29. (Previously Presented) A portable information apparatus according to claim 5, wherein:

the electroluminescence display device includes a source signal line, and

the memory circuits and the D/A converter are disposed to overlap with the source signal line.

30. (Previously Presented) A portable information apparatus according to claim 2, wherein:

the electroluminescence display device includes a gate signal line, and

the memory circuits and the D/A converter are disposed to overlap with the gate signal line.

31. (Previously Presented) A portable information apparatus according to claim 3, wherein:

the electroluminescence display device includes a gate signal line, and

the memory circuits and the D/A converter are disposed to overlap with the gate signal line.

32. (Previously Presented) A portable information apparatus according to claim 4, wherein:

the electroluminescence display device includes a gate signal line, and

the memory circuits and the D/A converter are disposed to overlap with the gate signal line.

33. (Previously Presented) A portable information apparatus according to claim 5, wherein:

the electroluminescence display device includes a gate signal line, and

the memory circuits and the D/A converter are disposed to overlap with the gate signal line.

34. (Previously Presented) A portable information apparatus according to claim 2, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

35. (Previously Presented) A portable information apparatus according to claim 3, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

36. (Previously Presented) A portable information apparatus according to claim 4, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

37. (Previously Presented) A portable information apparatus according to claim 5, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

38. (Previously Presented) A portable information apparatus according to claim 6, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

39. (Previously Presented) A portable information apparatus according to claim 7, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

40. (Previously Presented) A portable information apparatus according to claim 8, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

41. (Previously Presented) A portable information apparatus according to claim 9, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

42. (Previously Presented) A portable information apparatus according to claim 10, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

43. (Previously Presented) A portable information apparatus according to claim 11, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

44. (Previously Presented) A portable information apparatus according to claim 12, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

45. (Previously Presented) A portable information apparatus according to claim 13, wherein each of the memory circuits is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (FRAM) and a dynamic memory (DRAM).

46. (Previously Presented) A portable information apparatus according to claim 2, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

47. (Previously Presented) A portable information apparatus according to claim 3, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

48. (Previously Presented) A portable information apparatus according to claim 4, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

49. (Previously Presented) A portable information apparatus according to claim 5, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

50. (Previously Presented) A portable information apparatus according to claim 6, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

51. (Previously Presented) A portable information apparatus according to claim 7, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

52. (Previously Presented) A portable information apparatus according to claim 8, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

53. (Previously Presented) A portable information apparatus according to claim 9, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

54. (Previously Presented) A portable information apparatus according to claim 10, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

55. (Previously Presented) A portable information apparatus according to claim 11, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

56. (Previously Presented) A portable information apparatus according to claim 12, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

57. (Previously Presented) A portable information apparatus according to claim 13, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

58. (Previously Presented) A portable information apparatus according to claim 14, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

59. (Previously Presented) A portable information apparatus according claim 2, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

60. (Previously Presented) A portable information apparatus according claim 3, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

61. (Previously Presented) A portable information apparatus according claim 4, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

62. (Previously Presented) A portable information apparatus according claim 5, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

63. (Previously Presented) A portable information apparatus according claim 6, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

64. (Previously Presented) A portable information apparatus according claim 7, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

65. (Previously Presented) A portable information apparatus according claim 8, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

66. (Previously Presented) A portable information apparatus according claim 9, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

67. (Previously Presented) A portable information apparatus according claim 10, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

68. (Previously Presented) A portable information apparatus according claim 11, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

69. (Previously Presented) A portable information apparatus according claim 12, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

70. (Previously Presented) A portable information apparatus according claim 13, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

71. (Previously Presented) A portable information apparatus according claim 14, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

72. (Previously Presented) A portable information apparatus according claim 15, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

73-74. (Canceled).

75. (Previously Presented) A method of driving a portable information apparatus according to claim 20, wherein one readout operation is carried out for one frame period in the plurality of memory circuits.

76. (Previously Presented) A method of driving a portable information apparatus according to claim 21, wherein one readout operation is carried out for one frame period in the plurality of memory circuits.

77-78. (Canceled).

79. (Currently amended) A method of driving a portable information apparatus according to claim 20, wherein the memory circuit is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (~~PRAM~~ FRAM)and a dynamic memory (DRAM).

80. (Currently amended) A method of driving a portable information apparatus according to claim 21, wherein the memory circuit is a memory selected from the group consisting of a static memory (SRAM), a ferroelectric memory (~~PRAM~~ FRAM)and a dynamic memory (DRAM).

81-83. (Canceled).

84. (Previously Presented) A method of driving a portable information apparatus according to claim 20, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

85. (Previously Presented) A method of driving a portable information apparatus according to claim 21, wherein the memory circuits are formed on a substrate selected from the group consisting of a glass substrate, a plastic substrate, a stainless substrate, and a single crystal wafer.

86-89. (Canceled).

90. (Previously Presented) A method of driving a portable information apparatus according to claim 20, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

91. (Previously Presented) A method of driving a portable information apparatus according to claim 21, wherein the portable information apparatus is one selected from the group consisting of a portable telephone, a personal computer, a navigation system, a PDA, and an electronic book.

92-94. (Canceled).